We Claim:

1. A tunable semiconductor laser, comprising:

a resonator structure being subdivided longitudinally into at least two sections, said resonator structure, containing:

longitudinal ends;

an active layer generating radiation;

at least one of resonator end mirrors and gratings for bringing about an occurrence of an envisaged number of discrete modes in said sections, said discrete modes have spacings from one another and differ in said two sections of said resonator structure; and

a device for providing separate current injection into said active layer and provided in at least two of said sections; and

photonic crystals disposed at least at said longitudinal ends of said resonator structure, said photonic crystals having, as a band gap in which no wave-guiding takes place, a wavelength range in which a principal wavelength of the tunable semiconductor laser lies or a maximum gain of the tunable semiconductor laser occurs.

2. The tunable semiconductor laser according to claim 1, wherein the spacings of said discrete modes differ in at least two of said sections of said resonator structure at least by about a half-value width of said discrete modes.

3. The tunable semiconductor laser according to claim 1, wherein said two sections are two of a plurality of said sections having different mode spacings.

4. The tunable semiconductor laser according to claim 1, wherein said sections of said resonator structure have different longitudinal dimensions.

5. The tunable semiconductor laser according to claim 1, wherein at least one of said sections of said resonator structure is provided with a grating provided for mode selection.

6. The tunable semiconductor laser according to claim 5, wherein said grating is a binary superimposed grating.

7. The tunable semiconductor laser according to claim 1, wherein the spacings are in a range of 3 nm to 10 nm.

8. A method for producing a semiconductor laser, which comprises the steps of:

growing and doping a semiconductor layer structure having confinement layers and at least one active layer for generating radiation disposed between the confinement layers;

etching partial webs into the semiconductor layer structure using a mask;

applying and patterning an additional further mask layer using a photoresist mask in accordance with photonic crystals to be produced and resulting in a patterned mask layer;

etching holes into the semiconductor layer structure using the patterned mask layer;

removing the patterned mask layer;

applying a further mask which leaves free regions provided for gratings to be produced;

depositing and patterning a metal layer to form at least one grating in the free regions;

applying a dielectric material for filling the holes provided for the photonic crystals; and

applying contacts to the semiconductor layer structure.